2nd International School on Urban Physics and Urban Materials i-SUPER 2027

January 18 - 22 2027
Universität Stuttgart, International Meeting Center Eulenhof
Robert-Leicht-Strasse 161, 70569 Stuttgart, Germany

Supported by:

Topic:
The i-Super Winter School 2027 is an internationally renowned winter school for researchers especially in the early carrier phase, addressing the highly complex interactions of building materials with the environment and explores methods to describe these interaction using physics, chemistry as well as approaches based on social-sciences.

i-SUPER is organized by the Centre Nationale de la Recherche Scientifique (CNRS, France), University of Stuttgart (Germany) and TU Vienna (Austria). It is supported by the German Committee for Structural Concrete (DAfStb, Germany) and the International Federation for Structural Concrete (*fib*, Switzerland).

Experts from different countries and institutions will give talks ranging from the environmental footprint and durability of building materials, on analytical and

microstructural methods to explore and improve urban materials, methods to describe transport properties in such materials, transport of water, humidity, fresh air, heat and traffic in the urban context and its interaction with building materials. The key focus of i-SUPER 2027 is to explore the chances and risks for the urban environment provided and posed by AI methods for modelling, optimization and control purposes.

Participants of the i-SUPER 2027 Winter School are kindly asked to present their own research work with a poster and to participate in the preparation of a joint podiums discussion. Details will follow upon signup.

Organizers:

- Dr. Roland Pellenq (Institut Européen des Membranes, CNRS et U. Montpellier): roland.pellenq@cnrs.fr / pellenq@mit.edu
- Prof. Agathe Robisson (CEE, TU-Wien, Austria): agathe.robisson@tuwien.ac.at
- Prof. Michael Haist (Institute for Building Materials and Materials Testing Institute MPA University of Stuttgart, University of Stuttgart, Germany): michael.haist@iwb.uni-stuttgart.de
- Mrs Macielle Deiters (Institute for Building Materials, University of Stuttgart, Germany): macielle.deiters@iwb.uni-stuttgart.de

Location: University of Stuttgart, International Meeting Center Eulenhof, Robert-Leicht-Straße 161, 70569 Stuttgart

Lecturers (institution/contact info):

- Dr. Daniel Ferry (Centre Interdisciplinaire des Nanosciences de Marseille, CINaM, Aix – Marseille Université – CNRS, Marseille): daniel.ferry@cnrs.fr
- Prof. Laurent Brochard, (Ecole Nationale des Ponts et Chaussées, Paris-Tech, Paris, France): laurent.brochard@enpc.fr
- Prof. Edo Boek, (Dept. of Chemistry, Queen Mary College London, UK): e.boek@qmul.ac.uk
- Prof. Emanuela Del Gado (Dpt of Physics, Georgetown U., Washington DC, US): ed610@georgetown.edu
- Dr. Pierre Levitz (PHENIX, CNRS/Université Pierre et Marie Curie, Paris, France): pierre.levitz@upmc.fr
- Dr. Katerina Ioannidou (LMGC, CNRS/Université de Montpellier, France), aikaterini.ioannidou@umontpellier.fr
- Prof.. Agathe Robisson (CEE, TU-Wien, Austria): agathe.robisson@tuwien.ac.at
- Prof. Konstantin Sobolev (dpt of Civil Engineering, University of Wisconsin at Milwaukee, WI, US): sobolev@uwm.edu
- Prof. Andrea Parmeggiani (Institut Charles Coulomb, CNRS/Universite de Montpellier, France), andrea.parmeggiani@umontpellier.fr
- Prof. Michael Haist (Institute for Building Materials IWB, University of Stuttgart, Germany), michael.haist@iwb.uni-stuttgart.de
- Prof. Andrew Whittle (CEE, MIT, Cambridge, MA, US), ajwhittl@mit.edu

- Prof. Mohamed Javad Abdolhosseini Qomi (CEE, UC-Irvine, CA, US), mjaq@uci.edu
- Dr. Romain Dupuis (LMGC, CNRS/Université de Montpellier, France), romain.dupuis@umontpellier.fr
- Dr. Timm Weitkamp (SOLEIL Synchroton, Gif/Yvette, France)
- weitkamp@synchrotron-soleil.fr
- Dr. Farhang Radjai (LMGC, CNRS/Université de Montpellier, France), franck.radjai@umontpellier.fr
- Prof. Holger Steeb, (Dpt of Mechanical Eng., Stuttgart U., Germany), holger.steeb@mechbau.uni-stuttgart.de
- Dr. Pascal Hébraud (Institut de Physique et Chimie des Matériaux de Strasbourg): pascal.hebraud@ipcms.unistra.fr
- Prof. Henri Van Damme, (ESPCI, Paris), henri.van-damme@wanadoo.fr

Program / Curriculum:

- Henri van Damme, Andrew Whittle, Michael Haist, Holger Steeb, Pascal Hébraud: Urban forms and organizations, Materials Science and Geotechnics for resilient urban infrastructure,
- Daniel Ferry, Timm Weitkamp: Electron microscopy/electron and X-ray tomography techniques for urban materials imaging
- Emanuela Gado, Laurent Brochard, Romain Dupuis, Farhang Radjai: Simulations of multiscale porous and granular materials, deep learning techniques
- Pierre Levitz, Edo Boek: Multi-scale porous materials, texture, transport properties,
- Katerina Ioannidou, Konstantin Sobolev: Nanotechnology in construction materials, novel infrastructure materials
- Mohammed Javad Abdolhosseini Qomi, Roland Pellenq, Andrea Parmeggiani, Achim Menges, Sandra Nunes, Marina Stipedic: Urban physics for predicting climate events in the urban environment, from UHI to flooding and traffic jams; novel construction techniques, AI and robotics in construction
- Agathe Robisson: From lab to market: A personal journey in materials innovation

Registration, Accomodation and Costs:

The event is free of charge. Participants are kindly asked to register using the following link until the 15th of December: Registration for i-SUPER2027 | Institut für Werkstoffe im Bauwesen | Universität Stuttgart (https://www.iwb.uni-stuttgart.de/i-SUPER2027/anmeldung-i-SUPER2027/). Unless specified otherwise, participants pay for own travel, accommodation, catering etc.

Monday Jan. 18th:

08h30 – 09h00: Registration

09h00 – 09h15: Opening remarks by the organizers

Greetings by the Vice-President for Research of University of Stuttgart, Prof. Manfred Bischoff

09h15 – 10h45: Henri van Damme, Roland Pellenq, The urban environment in the context of climate change

10h45 – 11h15: Coffee break

11h15 – 12h45: Pierre Levitz, Multi-scale Porous and colloidal materials, texture and transport properties

12h45 – 14h00: Lunch

14h00 – 15h00: Students research poster presentations (session 1) – Individual rapid-fire presentations (4 minutes each) + grouped questions

15h00 – 16h30: Edo Boek, Multi-scale modeling of molecular/colloids transport properties

16h45 – 18h30: MPA University of Stuttgart – lab tour

From 18h30: Get-together with Pizza (address: Pfaffenwaldring 4, University of Stuttgart, 1st floor)

Tuesday Jan. 19th:

09h00 – 10h30: Holger Steeb, Characterization of porous and fractured materials by means of forced oscillations (title to be confirmed)

10h30 – 11h00: Coffee break

11h00 – 12h30: Andrea Parmeggiani, Transport properties – From molecules to traffic-jam

12h30 – 14h00: Lunch

14h00 – 15h00: Students research poster presentations (session 2) – Individual rapid-fire presentations (4 minutes each) + grouped questions

15h00 – 16h30: Andrew Whittle, Geotechnics for resilient urban infrastructure

16h30 – 17h00: Coffee break

17h00 – 18h30: Agathe Robisson, From lab to market: A personal journey in materials innovation

From 20h00: Professors Dinner

Self-organized: Team work on AI in construction and in the urban environment: The groups of students can use the debate sheets and structure their questions so that the panel can bring a valuable input;

Wednesday Jan. 20th:

09h00 – 10h30: Laurent Brochard, Statistical Physics and computer simulation techniques of the poro-mechanics of clays, cement, glass, wood, charcoal etc.

10h30 – 11h00: Coffee break

11h00 – 12h30: Michael Haist, Sustainability in the construction sector

12h30 – 14h00: Lunch

14h00 – 14h45: ONLINE: Mohammed Javad Abdolhosseini Qomi, Roland Pellenq Urban physics: predicting UHI, wind storm damages, flooding

14h45 – 15h30: ONLINE: Emanuela Del Gado, Infrastructure materials and soft matter and glass Physics, jamming transition, arrested dynamics, aging / Romain Dupuis, Machine learning techniques in the modeling of construction materials

15h30 – 16h00: Coffee break

16h00 – 16h45: Achim Menges (University of Stuttgart): Integrative design of transformative architecture – the role of robotics and AI in construction (to be confirmed)

16h45 – 17h30: Prof. Sandra Nunes (TU Delft): Construction goes Digital – Pathways and Challenges (to be confirmed)

17h30 – 18h00: Coffee break

18h00 – 19h30: Panel discussion on AI in construction and in the urban environment

Thursday Jan. 21st:

09h00 – 10h30: Konstantin Sobolev, Nanotechnology in construction materials

10h30 – 11h00: Coffee break

11h00 – 12h30: Pascal Hébraud, Flow and early age dynamics of cementitious pastes

12h30 – 14h00: Lunch

14h00 – 15h30: Katerina Ioannidou, Cement paste with novel and amazing properties

15h30 – 16h00: Marina Stipetic, Innovative bio-based and circular building materials

From 19h00: Get-together @Brewery (Location to be announced)

Friday Jan. 22nd:

08h30 – 10h00: Timm Weitkamp, Tomography with synchrotron light and the texture of multiscale porous materials

10h00 – 10h30: Coffee break

10h30 – 12h00: Daniel Ferry, Imaging urban materials from the nanoscale

12h00 – 12h30: Student Award ceremony & Closing remarks, Roland Pellenq / Agathe Robisson / Michael Haist

12h15 – 14h00: Lunch